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AUTHOR Schlenker, Richard M.
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ABSTRACT

This document presents the outline of a marine biology science unit designed to introduce students to the study and collection of organisms living in the intertidal zone. Details pertaining to the collection of interstitial organisms and a six-item quiz are included. (SL)

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LIFE BETWEEN THE GRAINS OF SAND;

AN INTRODUCTORY ACTIVITY FOR
BEGINNING MARINE EDUCATION STUDENTS

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By

Richard M. Schlenker
Technical Director
Intelligent Beachcombing
Maine Maritime Academy
Castine, Maine
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INTRODUCTION

The interface between land and sea is a place called the intertidal zone. For those not familiar with this terminology, the intertidal zone is that area covered by the high and uncovered by low tides. Here, much like the diversity shown on land, one finds a great variety of conditions under which animals and plants might and must live. Chief among these are the conditions related to the sandy beach, mud flat, and rocky shore. It is in these environs and their many combinations that tremendous numbers and types of organisms live.

People normally think of intertidal zone inhabitants as the snails and seaweeds so easily seen with the naked eye (macroscopic organisms). However, vast numbers of plants and animals which are not so easily seen (microscopic) also live in the intertidal zone.

While these minute creatures are common to all areas of the intertidal zone, it is those which reside (at least at low tide) on the sandy beach that are of interest. Where are they when the sand is uncovered? If you guessed, between the sand grains (interstitial spaces), you are correct. Many who are not continuous life-time residents of this area, take refuge here so that they might avoid dehydration while the beach is uncovered. Since this is the case, we could perhaps learn much about the near shore and intertidal zone if we could capture and study some of these plants (flora) and animals (fauna).

The primary purpose of this activity is to introduce students to life between the grains of sand.

OBJECTIVES

As a result of participating in this activity the student should be able to:

1. Gather interstitial organisms.
2. Observe interstitial organisms under a microscope.
3. Discuss some of the different forms, shapes, and other characteristics

of life in the intertidal zone.

DISCUSSION

There are several ways to collect these organisms. It is suggested that these collections be conducted at about half tide, that is half way between high and low tide. This location, however, may be tendered by the slope of the beach. If the slope of the beach is great, the water between sand grains will tend to drain rapidly and the water table will be deep. Remember, these organisms are constantly faced with dehydration problems. Therefore, in this type of environment, greater numbers of organisms will tend to be found near the surface in the lower tidal region.

1. Place a small shovel full of sand in a pail and cover the sand with about five centimeters of sea water. The sand sample should extend from the surface to a depth of about ten centimeters. Once the sample has been gathered and water added, it should be kneaded for three to five minutes. After the kneading process has been completed, some excess water will remain on the surface of the sand. This excess should be drained into a small glass dish (preferably clear glass so that light can pass through the dish).

The water sample should be analyzed, using two methods. First, a small hand lens (about 10 power or 10X) should be used. Following this, the water sample or part of it (it may be necessary to pour some of the sample into a smaller dish) should be observed under a dissecting or binocular microscope.

2. Dig a large hole in the sand. The hole should extend down below the water table until there is perhaps five centimeters of water in the hole. The water should then be swirled around the hole for a moment or two. A small dip net may then be moved through the water, and then be rinsed in a jar of sea water. The dip net can be one used for tropical fish or one fashioned from an old coat hanger and a nylon stocking. See Figure #1.

Figure #1. Dip net fashioned from a coat hanger and nylon stocking.



If the homemade variety is constructed, the stocking should be either sewn around the top or fastened with waterproof glue.

An alternative to using a nylon stocking is to use bolting cloth. Whatever the material, the size of the mesh will determine the quantity and sizes of the organisms that are captured. Many of the very small organisms will probably pass through the mesh of the dip net or the nylon stocking.

After the organisms have been collected, they may be investigated as in Step One.

3. In the third method, the hole is dug and the water swirled as in method two. Then a glass jar is used to scoop up some of the sand and water. Following this, the organisms are observed as in Step One.

MATERIALS

Some, but not necessarily all, of these materials are necessary in order to successfully conduct this exercise.

1. One small shovel or other digging implement.
2. One small pail.
3. One hand lens (10X or stronger).
4. One dissecting or binocular microscope.
5. Several texts about plankton and other intertidal organisms (those with pictures or drawings are especially good).
6. One dip net.
7. One glass jar.
8. Two glass viewing dishes.
9. One coat hanger.

10. One nylon stocking.
11. A length of bolting cloth.
12. A tube of waterproof glue.
13. A spool of thread.
14. One needle.

PROCEDURES

1. Gather the equipment necessary to collect the interstitial (thalassop-sammon) organisms. The following items will lead to successful completion of the activity; pail, shovel, hand lens.
2. Collect the organisms.
3. Observe the organisms and compare them with those found in various text books. At this point, it might be wise to quickly and briefly sketch some of the organisms that are being observed. Use the space below for this.

4. Answer the following questions:

- a. Are there any characteristic shapes to these organisms? _____

- b. There are probably both plants and animals in your sample. Can you tell them apart, and if so, how? _____

- c. What can be said of the sizes of these organisms? _____

- d. If you wanted to get an idea of how much life there was in a given area of sand, how might you proceed? _____

- e. How might you account for the shapes of these organisms? _____

- f. Generally, do these organisms have color? _____

You may find the answers to these questions by consulting Appendix A.

REFERENCES

Zinn, D. J., *THE BEACH STROLLERS HANDBOOK FROM MAINE TO CAPE HATTERAS*.
Chester, Connecticut, The Pequot Press, 1975.

SUGGESTIONS FOR FURTHER STUDY

1. Identify interstitial organisms by scientific name.
2. Relate interstitial species to other groups found in the intertidal zone.
3. Investigate the number or quantity of life found in a given area of beach.
4. Compare the quantity of life with the slope of the beach.

APPENDIX A

ANSWERS TO QUESTIONS FROM
THE PROCEDURES SECTION

- 4a. The organisms must slide between and around the sand grains; therefore, many will be found to be elongated. This, however, is not to say that other shapes are non-existent.
- b. One possible way of telling them apart is by movement. You might guess that some of the animals might show active movement.
- c. The size range will depend upon the method of collection. If a method is used which allows the escape of the smallest number of organisms, then a variety of sizes should be observed.
- d. One way to accomplish this is to control as many varying factors as possible. For example, we might investigate the amount of life in a 20 cm. X 20 cm. rectangle. Then it would be necessary to collect all of the sand in this area, thoroughly wash it, and proceed to evaluate the quantity of collected material. This might be done by counting the number of organisms present or by dehydrating and then weighing the material you have collected.
- e. One can account for the shapes of the organisms because of the need for the interstitial dwellers to slide between the grains of sand. The elongated shape is an adaptation to the environment.
- f. The organisms are generally void of color.